

PATENT ABSTRACTS OF JAPAN

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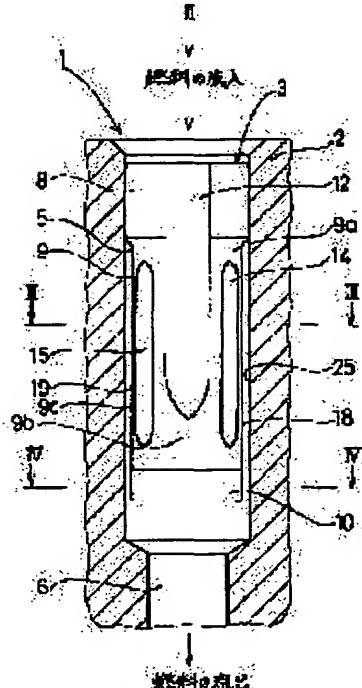
(54) FILTER

(57)Abstract:

PURPOSE: To provide a filter by which mesh clogging is prevented and whose foreign matter scavenging capacity is improved.

CONSTITUTION: A large diameter part 8 of a filter main body 3 is pressed in and fixed to an inlet part of an inner wall 25 to form a through hole 5 of a nozzle holder 2. A first small diameter part 9 connected to this large diameter part 8 is formed in an elliptic column shape, and a first foreign matter scavenging groove 12 is formed in a short diameter part 9b.

Second foreign matter scavenging grooves 14 and 15 are formed between the short diameter part 9b of the first small diameter part 9 and a long diameter part 9c. A filtration clearance gradually becoming small as it proceeds to the long diameter part 9c from the short diameter part 9b in the circumferential direction of the first small diameter part 9, is formed between the first small diameter part 9 and the inner wall 25. Inlet side fuel of the filter main body 3 passes through a passage between the inner wall 25 and the first foreign matter scavenging groove 12, and flows in the circumferential direction of the first small diameter part 9, and enters the filtration clearance. Then, a foreign matter is scavenged by the first scavenging groove 12 and the second scavenging grooves 14 and 15 according to the size of the foreign matter, and the fuel from which the foreign matter is removed flows out to a downstream side through hole 6 of the filter main body 3.



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CLAIMS

[Claim(s)]

[Claim 1] The filter with which the aforementioned filtration crevice is small characterized by the bird clapper as it has the main part of a filter characterized by providing the following and goes for the hoop direction of the aforementioned narrow diameter portion to the aforementioned 2nd foreign matter uptake slot from the aforementioned 1st foreign matter uptake slot. The nozzle holder which has the through-hole which pours a liquid. The 1st foreign matter uptake slot formed in the outer wall of the aforementioned major-diameter section so that the entrance side and the aforementioned filtration crevice between a narrow diameter portion and the aforementioned major-diameter section which form a filtration crevice between the walls which are connected to the major-diameter section fixed to the entrance section of the wall which forms the aforementioned through-hole, and this major-diameter section, and form the aforementioned through-hole may be opened for free passage, and the 2nd foreign matter uptake slot formed in the outer wall of the aforementioned narrow diameter portion.

[Claim 2] The upstream of the aforementioned narrow diameter portion in which the aforementioned 1st foreign matter uptake slot and the aforementioned 2nd foreign matter uptake slot are formed is a filter according to claim 1 characterized by being formed the shape of an elliptic cylinder, and in the shape of a hexagonal prism.

[Claim 3] The fuel injection equipment characterized by preparing a filter according to claim 1 or 2 between a fuel injection pump and a fuel injection valve.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the bar filter which prevents that the foreign matter in fuel invades into the fuel injection valve for diesel power plants in detail about a filter.

[0002]

[Description of the Prior Art] Conventionally, as shown in JP,3-6052,U, the fuel injection nozzle which prepared the filter from which the foreign matter in fuel is removed in the fuel-nozzle entrance section of a diesel power plant is known. The filter attached in the entrance section of this fuel injection nozzle makes small uniformly the fuel filtration crevice which forms a spiral slot in the peripheral face of a pillar-like bar filter, and is formed of this slot, and it is made to remove a foreign matter.

[0003]

[Problem(s) to be Solved by the Invention] However, according to such a conventional filter, there is a problem of being easy to generate blinding into the slot on the filter, and being easy to generate the situation of barring passage of fuel by this blinding, or taking up a fuel path. Removing exactly the foreign matter which invades into the fuel entrance section of a fuel injection nozzle from the outside to the thing of a small foreign matter in connection with the high injection pressure of fuel progressing further generally, so that it may correspond to tightening [of a diesel power plant] up regulation of exhaust gas, and minor diameter-ization of the diameter of a nozzle hole of a fuel injection nozzle being advanced is called for strongly.

[0004] this invention aims at offering the filter which was made in order to solve the above-mentioned trouble, prevents blinding, and improves the uptake capacity of a foreign matter.

[0005]

[Means for Solving the Problem] The filter according to claim 1 by this invention for solving the aforementioned technical problem The major-diameter section fixed to the entrance section of the nozzle holder which has the through-hole which pours a liquid, and the wall which forms the aforementioned through-hole, The narrow diameter portion which forms a filtration crevice between the walls which are connected to this major-diameter section, and form the aforementioned through-hole, The 1st foreign matter uptake slot formed in the outer wall of the aforementioned major-diameter section so that the entrance side and the aforementioned filtration crevice between the aforementioned major-diameter sections may be opened for free passage, And it has the main part of a filter which has the 2nd foreign matter uptake slot formed in the outer wall of the aforementioned narrow diameter portion, and the aforementioned filtration crevice is small characterized by the bird clapper as it goes for the hoop direction of the aforementioned narrow diameter portion to the aforementioned 2nd foreign matter uptake slot from the aforementioned 1st foreign matter uptake slot.

[0006] Moreover, the upstream of the aforementioned narrow diameter portion in which, as for the filter according to claim 2 by this invention, the aforementioned 1st foreign matter uptake slot and the aforementioned 2nd foreign matter uptake slot are formed in a filter according to claim 1 is characterized by being formed the shape of an elliptic cylinder, and in the shape of a hexagonal prism. Furthermore, the fuel injection equipment according to claim 3 by this invention is characterized by preparing a filter according to claim 1 or 2 between a fuel injection pump and a fuel injection valve.

[0007]

[Function and Effect(s) of the Invention] According to the filter of this invention according to claim 1, according to the size of a foreign matter, the uptake of the foreign matter is small carried out from a bird clapper in the part where the size of a filtration crevice is suitable as the filtration crevice formed between the wall of the through-hole of a nozzle holder and the narrow diameter portion of the main part of a filter goes to the 2nd foreign matter uptake slot from the

1st foreign matter uptake slot. Thereby, since the uptake of the big foreign matter is carried out relatively in a big crevice and it does not arrive at the small crevice between downstreams, it is effective in the ability to prevent generating of the blinding by the big foreign matter.

[0008] Moreover, according to the filter of this invention according to claim 2, the interval of the filtration crevice near [which is formed in a narrow diameter portion] the 2nd foreign matter uptake slot can be made small by forming the upstream of the narrow diameter portion in which the 1st foreign matter uptake slot and the 2nd foreign matter uptake slot are formed the shape of an elliptic cylinder, and in the shape of a hexagonal prism. Thereby, there is an effect which can improve the uptake capacity of a foreign matter. Furthermore, according to the fuel injection equipment of this invention according to claim 3, since the aforementioned filter was prepared between the fuel injection pump and the fuel injection valve, it is effective in the ability to guarantee the proper operation of the fuel injection valve as a precision moving part for a long period of time.

[0009]

[Example] Hereafter, the example of this invention is explained based on a drawing.

(The 1st example) The filter by the 1st example of this invention is shown in drawing 1 - drawing 4. Inside the nozzle holder 2, insertion fixation of the main part 3 of a filter is carried out, and this filter 1 is constituted.

[0010] A nozzle holder 2 has the through-hole 5 of the shape of a cylinder of the major diameter prolonged in the shaft orientations of a cross-section round shape at the entrance section, and the through-hole 6 of a minor diameter is opening it for free passage to the soffit. Insertion fixation of the main part 3 of a filter is carried out at the through-hole 5 of this major diameter. The quality of the material of the main part 3 of a filter is for example, S45CF, high pressure is borne and shaft-orientations length is 20mm - 30mm. The main part 3 of a filter consists of the major-diameter section 8 of the shape of a pillar fixed to the entrance side of a through-hole 5 by pressing fit, the first narrow diameter portion 9 of the shape of an elliptic cylinder connected to the soffit of this major-diameter section 8, and the major axis of the ellipse of this first narrow diameter portion 9 and the second narrow diameter portion 10 of the shape of a pillar of *****.

[0011] It is formed in the outer wall to which the 180 degrees of the first foreign matter uptake slots 12 and 13 counter mutually the periphery side attachment wall of the major-diameter section 8 at a hoop direction at the concave. The entrance side is opening these first foreign matter uptake slots 12 and 13 for free passage to the upper limit of the major-diameter section 8, and the soffit is prolonged to the halfway section of the outer wall of minor-axis section 9b of the first narrow diameter portion 9. These first foreign matter uptake slots 12 and 13 combine the role which circulates fuel, and the role which carries out the uptake of the foreign matter.

[0012] The concave second foreign matter uptake slots 14, 15, 16, and 17 are formed in the position rotated from the first foreign matter uptake slots 12 and 13 about 45 degrees to the hoop direction four places at periphery side-attachment-wall 9a of the first narrow diameter portion 9. Periphery side-attachment-wall 9a of major-axis section 9c of the first narrow diameter portion 9 corresponding to the position rotated from the first foreign matter uptake slots 12 and 13 90 degrees to the hoop direction again is equipped with the flat parts 18 and 19 formed in the flat field. The soffit of these flat parts 18 and 19 is prolonged to the periphery side attachment wall of the edge 10 of the main part 3 of a filter, i.e., the second narrow diameter portion.

[0013] Between the walls 25 of a nozzle holder 2 and periphery side-attachment-wall 9a of the first narrow diameter portion 9 which form a through-hole 5, it goes to a hoop direction at major-axis section 9c from minor-axis section 9b of the first narrow diameter portion 9, and is the filtration crevice LL 1, L1, M1, and S1. It is formed and there is a relation of LL1 > L1 > M1 > S1. The fuel which flowed into the first foreign matter uptake slot 12 where this is formed in minor-axis section 9b flows to the hoop direction of the first narrow diameter portion 9. Filtration crevice LL 1 among the foreign matters into which it went The uptake of the large thing is carried out to the first foreign matter uptake slots 12 and 13. Filtration crevice LL 1 It is the filtration crevice L1 small. It is for carrying out the uptake of the large foreign matter to through-hole 5a between periphery side-attachment-wall 9a of the first narrow diameter portion 9, and the wall 25 of a nozzle holder 2. the filtration crevice M1 which becomes still narrower toward major-axis section 9c and S1 [moreover,] Filtration crevice L1 It is the filtration crevice M1 small. The uptake of the large foreign matter is carried out in the second foreign matter uptake slots 14, 15, 16, and 17. Filtration crevice M1 It is the filtration crevice S1 small. It is for carrying out the uptake of the large foreign matter to through-hole 5b between periphery side-attachment-wall 9a of the first narrow diameter portion 9, and the wall 25 of a nozzle holder 2.

[0014] Filtration crevice S1 narrowest here The interval is set up so that it may become still narrower than the narrowest filtration crevice between the conventional filters. Thereby, according to the size of a foreign matter, the uptake of the foreign matter is carried out by the first uptake slots 12 and 13, through-hole 5a, the second uptake slots 14, 15, 16, and 17, and through-hole 5b. Next, a removal operation of a foreign matter is explained.

[0015] if fuel is fed and it comes to the entrance side of a filter 1 from the fuel injection pump which is not illustrated --

the first foreign matter uptake slots 12 and 13 -- fuel -- entering -- through-hole 5a -- further -- the second foreign matter uptake slots 14, 15, 16, and 17 -- it flows into flat parts 18 and 19 through-hole 5b continuously. When fuel passes these each foreign matter uptake slots 12, 13, 14, 15, 16, and 17 and Through-holes 5a and 5b, it is the filtration crevice LL 1, L1, M1, and S1. The foreign matter with which sizes differ can be removed. The fuel from which the foreign matter was removed flows into the through-hole 6 of the downstream of the main part 3 of a filter through through-hole 5c between the filtration crevice LL 1, L1, M1, S1 and flat parts 18 and 19, and the wall 25 of a nozzle holder 2.

[0016] According to the 1st example, the main part 3 of a filter which has the elliptic-cylinder-like first narrow diameter portion 9 to the through-hole 5 of the shape of a cylinder of a nozzle holder 2 is inserted. From the first foreign matter uptake slots 12 and 13 being formed in minor-axis section 9b of periphery side-attachment-wall 9a of the first narrow diameter portion 9 The filtration crevice LL 1 formed the wall 25 of the first narrow diameter portion 9, periphery side-attachment-wall 9a, and in between as it goes to a hoop direction along with periphery side-attachment-wall 9a, L1, M1, and S1 It becomes narrow gradually. Therefore, it is the filtration crevice LL 1, L1 and M1, and S1 by the size of the foreign matter in the fuel which flows to a hoop direction, respectively. A big foreign matter can be removed. Thereby, from the parts where the uptake of the foreign matter is carried out by the size of a foreign matter differing, since the uptake of the big foreign matter is carried out relatively in a big crevice and it does not arrive at the small crevice between downstreams, it can prevent generating of the blinding by the big foreign matter.

[0017] Moreover, the wall 25 of the first narrow diameter portion 9, periphery side-attachment-wall 9a, and the narrowest filtration crevice S1 formed in between Since the interval is set up so that it may become still narrower than the narrowest filtration crevice between the conventional filters, it can raise the uptake capacity of a foreign matter. Furthermore, the main part 3 of a filter can be formed easily, and it is easy to manufacture it by processing a pillar member, and since an appearance is a pressure-resistant high configuration, it demonstrates the filter ability by the ** form effect under high-pressure fuel proper also under high pressure. About attachment nature, it is attached by the easy operation of pressing [of the main part 3 of a filter to a through-hole 5] fit, and a foreign matter uptake slot and a filtration crevice are formed simultaneously with this pressing fit.

[0018] (The 2nd example) The filter by the 2nd example of this invention is shown in drawing 5 - drawing 8 . About the same component, the same sign is substantially attached with the 1st example. As shown in drawing 5 - drawing 8 , the point which formed the first narrow diameter portion 29 of the main part 3 of a filter which constitutes a filter 1 in the shape of a hexagonal prism differs from the 1st example.

[0019] The main part 3 of a filter consists of the major-diameter section 8 of the shape of a pillar fixed to the entrance side of a through-hole 5 by pressing fit, the first narrow diameter portion 29 of the shape of a hexagonal prism connected to the soffit of this major-diameter section 8, and the circumscribed circle of a hexagon and the second narrow diameter portion 10 of ***** that are the cross-section configuration of this first narrow diameter portion 29. The concave second foreign matter uptake slots 34, 35, 36, and 37 are formed in the position rotated from the first foreign matter uptake slots 32 and 33 about 45 degrees to the hoop direction four places at periphery side-attachment-wall 29a of the first narrow diameter portion 29. In the outer wall flat parts 38 and 39 corresponding to the position rotated from the first foreign matter uptake slots 32 and 33 90 degrees to the hoop direction, the soffit of these outer wall flat parts 38 and 39 is prolonged to the periphery side attachment wall of the edge 10 of the main part 3 of a filter, i.e., the second narrow diameter portion, without forming a foreign matter uptake slot.

[0020] Between the walls 25 of a nozzle holder 2 and periphery side-attachment-wall 29a of the first narrow diameter portion 29 which form a through-hole 28, it is the filtration crevice LL 2, L2, M2, and S2 to a hoop direction from the first foreign matter uptake slots 32 and 33 to the outer wall flat parts 38 and 39. It is formed and there is a relation of LL2 >L2 >M2 >S2 like the 1st example. This shows that the parts where the fuel which flowed into the first foreign matter uptake slot 32 flows to the hoop direction of the first narrow diameter portion 29, and the uptake of the foreign matter is carried out by the size of the foreign matter into which it went differ. That is, a uptake is carried out to order from a large foreign matter at through-hole 28b between periphery side-attachment-wall 29a of through-hole 28a between periphery side-attachment-wall 29a of the first foreign matter uptake slots 32 and 33 and the first narrow diameter portion 29, and the wall 25 of a nozzle holder 2, the second foreign matter uptake slots 34, 35, 36, and 37, and the first narrow diameter portion 29, and the wall 25 of a nozzle holder 2. Thereby, according to the size of a foreign matter, the uptake of the foreign matter is carried out like the 1st example by the first uptake slots 32 and 33, through-hole 28a, the second uptake slots 34, 35, 36, and 37, and through-hole 28b.

[0021] Since the interval of the wall 25 of a nozzle holder 2 and periphery side-attachment-wall 29a of the first narrow diameter portion 29 spreads by having made the first narrow diameter portion 29 into the shape of a hexagonal prism according to the 2nd example, the capacity of through-hole 28a can be made to increase, and it is the latus filtration

crevice LL 2 most. Narrowest filtration crevice S2 A ratio can be enlarged. It carries out and they are the first foreign matter uptake slots 32 and 33 or the filtration crevice LL 2 about ***** and a large foreign matter. A uptake is carried out and it is the filtration crevice LL 2, L2, and M2. The uptake of the small foreign matter can be carried out in the filtration crevice S. Thereby, according to the size of a foreign matter, the uptake of the foreign matter is carried out by the first uptake slots 32 and 33, through-hole 28a, the second uptake slots 34, 35, 36, and 37, and through-hole 28b, and it is the filtration crevice LL 2, L2, and M2. A big foreign matter is the filtration crevice S2. Since it does not flow in a place, generating of the blinding by the big foreign matter can be prevented.

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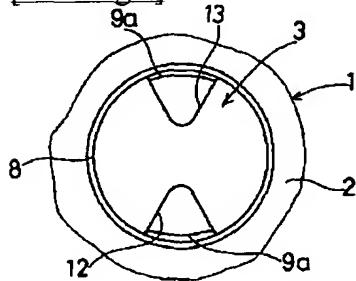
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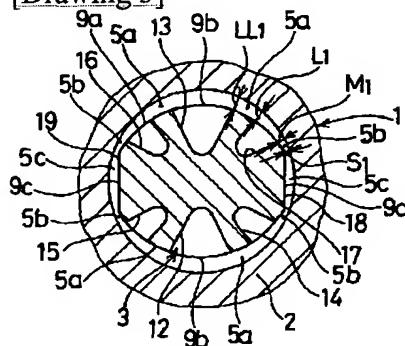
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DRAWINGS

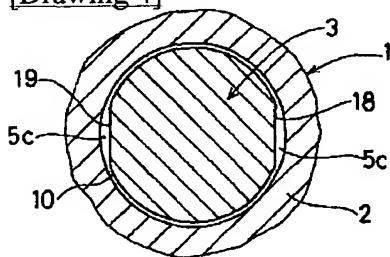
[Drawing 2]



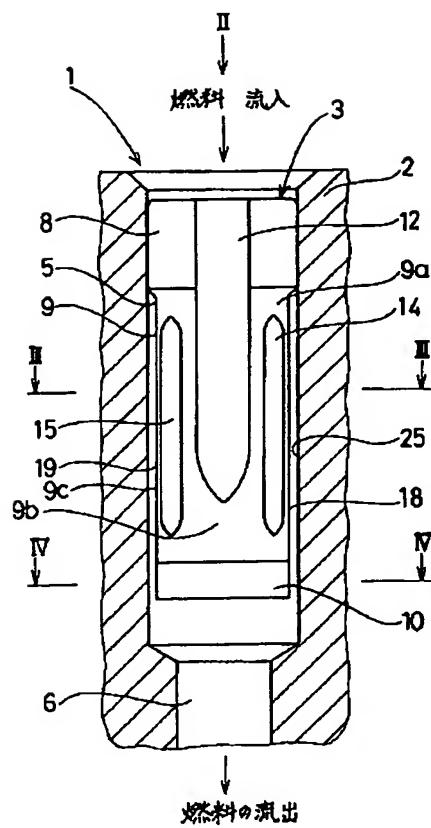
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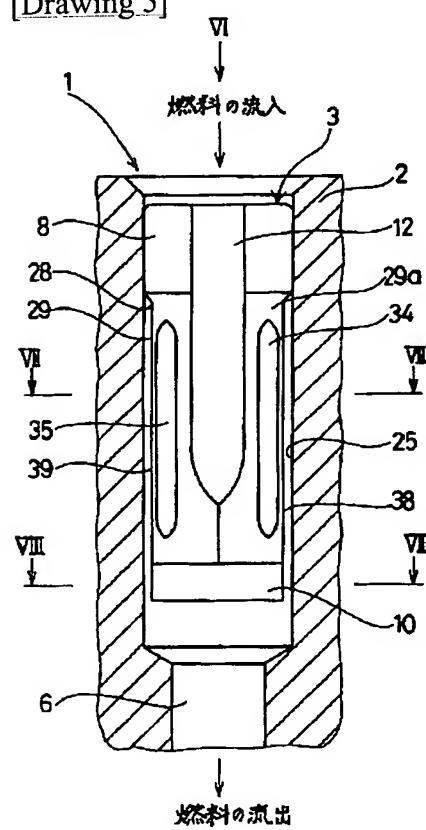
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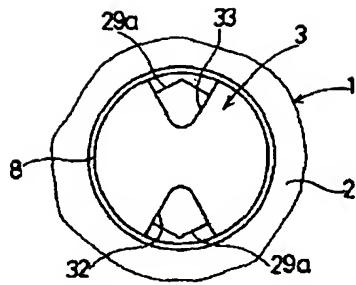
[Drawing 1]



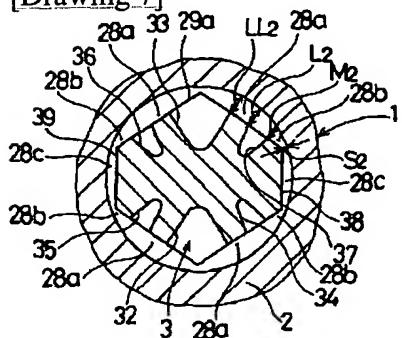
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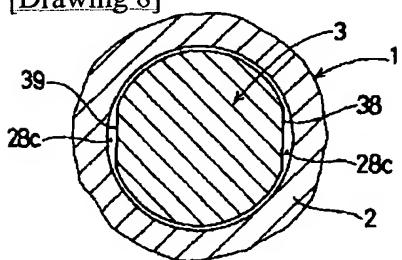
[Drawing 6]



[Drawing 7]



[Drawing 8]



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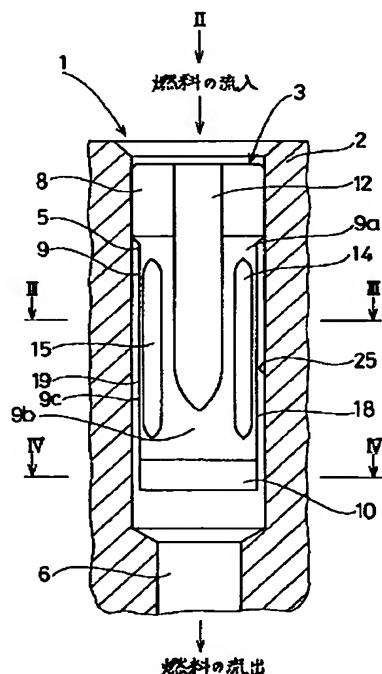
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(54)【発明の名称】 フィルタ

(57)【要約】

【目的】 目詰まりを防止しあつ異物の捕集能力を向上するフィルタを提供する。

【構成】 ノズルホールダ2の通孔5を形成する内壁25の入口部にフィルタ本体3の大径部8が圧入固定される。この大径部8に接続される第一小径部9は楕円柱状に形成され、第一異物捕集溝12が短径部9bに形成される。また第一小径部9の短径部9bと長径部9cとの間には、第二異物捕集溝14、15が形成される。さらに第一小径部9と内壁25との間には、第一小径部9の周方向に短径部9bから長径部9cに行くにしたがい徐々に小さくなるろ過隙間が形成される。フィルタ本体3の入口側の燃料は、内壁25と第一異物捕集溝12との間の通路を通り、第一小径部9の周方向に流れ前記ろ過隙間にに入る。すると、異物の大きさに応じて第一捕集溝12と第二捕集溝14、15で異物が捕集され、異物が除去された燃料がフィルタ本体3の下流側の通孔6へと流出する。



【特許請求の範囲】

【請求項1】 液体を流す通孔を有するノズルホルダと、前記通孔を形成する内壁の入口部に固定される大径部、この大径部に接続され、かつ前記通孔を形成する内壁との間にろ過隙間を形成する小径部、前記大径部の入口側と前記ろ過隙間とを連通するように前記大径部の外壁に形成される第1異物捕集溝、および前記小径部の外壁に形成される第2異物捕集溝を有するフィルタ本体とを備え、

前記第1異物捕集溝から前記第2異物捕集溝に前記小径部の周方向に行くにしたがい前記ろ過隙間が小さくなることを特徴とするフィルタ。

【請求項2】 前記第1異物捕集溝と前記第2異物捕集溝とが形成される前記小径部の上流側は、楕円柱状または六角柱状に形成されることを特徴とする請求項1記載のフィルタ。

【請求項3】 燃料噴射ポンプと燃料噴射弁との間に請求項1または2記載のフィルタを設けたことを特徴とする燃料噴射装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、フィルタに関するもので、詳細には、ディーゼルエンジン用燃料噴射弁中に燃料中の異物が侵入するのを防止するバーフィルタに関するものである。

【0002】

【従来の技術】従来より、実開平3-6052号公報に示されるように、ディーゼルエンジンの燃料ノズル入口部に燃料中の異物を除去するフィルタを設けた燃料噴射ノズルが知られている。この燃料噴射ノズルの入口部に取り付けられるフィルタは、円柱状のバーフィルタの外周面に螺旋状の溝を形成し、この溝によって形成される燃料ろ過隙間を均一に小さくして異物を取り除くようにしている。

【0003】

【発明が解決しようとする課題】しかしながら、このような従来のフィルタによると、フィルタの溝に目詰まりが発生しやすく、この目詰まりによって燃料の通過を妨げたり、燃料通路を塞いでしまうという事態が発生しやすいという問題がある。一般に、ディーゼルエンジンの排気ガス規制強化に対応するように燃料の高噴射圧が一層進み、また燃料噴射ノズルの噴孔径の小径化が進められていることに伴い、燃料噴射ノズルの燃料入口部に外部から侵入してくる異物を小さな異物のものまで的確に除去することが強く求められている。

【0004】本発明は、上記問題点を解決するためになされたもので、目詰まりを防止しつつ異物の捕集能力を向上するフィルタを提供することを目的とする。

【0005】

【課題を解決するための手段】前記の課題を解決するための本発明による請求項1記載のフィルタは、液体を流す通孔を有するノズルホルダと、前記通孔を形成する内壁の入口部に固定される大径部、この大径部に接続され、かつ前記通孔を形成する内壁との間にろ過隙間を形成する小径部、前記大径部の入口側と前記ろ過隙間とを連通するように前記大径部の外壁に形成される第1異物捕集溝、および前記小径部の外壁に形成される第2異物捕集溝を有するフィルタ本体とを備え、前記第1異物捕集溝から前記第2異物捕集溝に前記小径部の周方向に行くにしたがい前記ろ過隙間が小さくなることを特徴とする。

【0006】また、本発明による請求項2記載のフィルタは、請求項1記載のフィルタにおいて、前記第1異物捕集溝と前記第2異物捕集溝とが形成される前記小径部の上流側は、楕円柱状または六角柱状に形成されることを特徴とする。さらに、本発明による請求項3記載の燃料噴射装置は、燃料噴射ポンプと燃料噴射弁との間に請求項1または2記載のフィルタを設けたことを特徴とする。

【0007】

【作用および発明の効果】本発明の請求項1記載のフィルタによると、ノズルホルダの通孔の内壁とフィルタ本体の小径部との間に形成されるろ過隙間は、第1異物捕集溝から第2異物捕集溝に行くにしたがい小さくなることから、異物の大きさに応じてろ過隙間の大きさの適当な箇所で異物が捕集される。これにより、大きな異物は相対的に大きな隙間で捕集され下流側の小さな隙間には到達しないので、大きな異物による目詰まりの発生を防止することができる効果がある。

【0008】また、本発明の請求項2記載のフィルタによると、第1異物捕集溝と第2異物捕集溝とが形成される小径部の上流側を楕円柱状または六角柱状に形成することにより、小径部に形成される第2異物捕集溝付近のろ過隙間の間隔を小さくできる。これにより、異物の捕集能力を向上することができる効果がある。さらに、本発明の請求項3記載の燃料噴射装置によると、燃料噴射ポンプと燃料噴射弁との間に前記フィルタを設けたことから、精密摺動部品としての燃料噴射弁の適正な作動を長期間保証することができる効果がある。

【0009】

【実施例】以下、本発明の実施例を図面に基づいて説明する。

(第1実施例) 本発明の第1実施例によるフィルタを図1～図4に示す。このフィルタ1は、ノズルホルダ2の内部にフィルタ本体3が挿入固定され構成されている。

【0010】ノズルホルダ2は、入口部に断面円形の軸方向に延びる大径の円筒状の通孔5を有し、その下端に小径の通孔6が連通している。この大径の通孔5にフィルタ本体3が挿入固定されている。フィルタ本体3の材

質は例えばS 4 5 C Fであり高圧に耐え、軸方向長さは例えば20mm~30mmである。フィルタ本体3は、通孔5の入口側に圧入によって固定される円柱状の大径部8と、この大径部8の下端に接続される梢円柱状の第二小径部9と、この第一小径部9の梢円の長径と略同径の円柱状の第二小径部10とからなる。

【0011】大径部8の外周側壁には、第一異物捕集溝12、13が互いに周方向に180°対向する外壁に凹状に形成されている。この第一異物捕集溝12、13は、その入口側が大径部8の上端に連通しており、下端が第一小径部9の短径部9bの外壁の中途部まで延びている。この第一異物捕集溝12、13は、燃料を流通させる役割と異物を捕集する役割を兼ね備えている。

【0012】第一小径部9の外周側壁9aには、第一異物捕集溝12、13から周方向に45°程度回転した位置に凹状の第二異物捕集溝14、15、16、17が4箇所形成されている。また第一異物捕集溝12、13から周方向に90°回転した位置に対応する第一小径部9の長径部9cの外周側壁9aには、平坦な面に形成された平坦部18、19を備えている。この平坦部18、19の下端は、フィルタ本体3の端部、すなわち第二小径部10の外周側壁まで延びている。

【0013】通孔5を形成するノズルホルダ2の内壁25と第一小径部9の外周側壁9aとの間には、第一小径部9の短径部9bから周方向に長径部9cに向ってろ過隙間LL₁、L₁、M₁、S₁が形成されており、
 $LL_1 > L_1 > M_1 > S_1$

の関係がある。これは、短径部9bに形成される第一異物捕集溝12に流入した燃料が第一小径部9の周方向に流れ、入った異物のうち、ろ過隙間LL₁よりも大きいものは第一異物捕集溝12、13に捕集し、ろ過隙間LL₁より小さくかつろ過隙間L₁より大きい異物を第一小径部9の外周側壁9aとノズルホルダ2の内壁25との間の通孔5aに捕集するためであり、また長径部9cに向ってさらに狭くなるろ過隙間M₁、S₁によって、ろ過隙間L₁より小さくかつろ過隙間M₁より大きい異物を第二異物捕集溝14、15、16、17で捕集し、ろ過隙間M₁より小さくかつろ過隙間S₁より大きい異物を第一小径部9の外周側壁9aとノズルホルダ2の内壁25との間の通孔5bに捕集するためである。

【0014】ここで、最も狭いろ過隙間S₁の間隔は、従来のフィルタの最も狭いろ過隙間よりさらに狭くなるように設定されている。これにより、異物の大きさに応じて第一捕集溝12、13、通孔5a、第二捕集溝14、15、16、17、通孔5bで異物が捕集される。次に、異物の除去作用について説明する。

【0015】図示しない燃料噴射ポンプより燃料が圧送されてフィルタ1の入口側にくると、第一異物捕集溝12、13へ燃料が入り、通孔5a、さらに第二異物捕集溝14、15、16、17、通孔5b統いて平坦部1

8、19に流れ込む。この各異物捕集溝12、13、14、15、16、17および通孔5a、5bを燃料が通過する時、ろ過隙間LL₁、L₁、M₁、S₁によって大きさの異なる異物を取り除くことができる。異物が除去された燃料は、ろ過隙間LL₁、L₁、M₁、S₁および平坦部18、19とノズルホルダ2の内壁25との間の通孔5cを通りフィルタ本体3の下流側の通孔6へと流出する。

【0016】第1実施例によると、ノズルホルダ2の円筒状の通孔5に対し梢円柱状の第一小径部9を有するフィルタ本体3が挿入されており、第一小径部9の外周側壁9aの短径部9bに第一異物捕集溝12、13が形成されていることから、外周側壁9aに沿って周方向に行くにしたがい第一小径部9の内壁25と外周側壁9aと間に形成されるろ過隙間LL₁、L₁、M₁、S₁が徐々に狭くなる。したがって、周方向に流れる燃料中の異物の大きさによってそれぞれろ過隙間LL₁、L₁、M₁、S₁より大きな異物を取除くことができる。これにより、異物の大きさによって異物の捕集される箇所が異なることから、大きな異物は相対的に大きな隙間で捕集され下流側の小さな隙間には到達しないため、大きな異物による目詰まりの発生を防止することができる。

【0017】また、第一小径部9の内壁25と外周側壁9aと間に形成される最も狭いろ過隙間S₁の間隔は、従来のフィルタの最も狭いろ過隙間よりさらに狭くなるように設定されていることから、異物の捕集能力を向上させることができる。さらに、フィルタ本体3は、円柱部材を加工することで容易に形成可能で製作しやすいし、外形は耐圧性の高い形状であるから高圧燃料下での保形効果によるフィルタ機能を高圧下でも適正に発揮する。取付性については、通孔5へのフィルタ本体3の圧入という簡単な操作で取り付けられ、この圧入と同時に異物捕集溝とろ過隙間が形成される。

【0018】(第2実施例) 本発明の第2実施例によるフィルタを図5~図8に示す。第1実施例と実質的に同一の構成部分については同一符号を付す。図5~図8に示すように、フィルタ1を構成するフィルタ本体3の第一小径部29を六角柱状に形成した点が第1実施例と異なる。

【0019】フィルタ本体3は、通孔5の入口側に圧入によって固定される円柱状の大径部8と、この大径部8の下端に接続される六角柱状の第二小径部10とからなる。第一小径部29の外周側壁29aには、第一異物捕集溝32、33から周方向に45°程度回転した位置に凹状の第二異物捕集溝34、35、36、37が4箇所形成されている。第一異物捕集溝32、33から周方向に90°回転した位置に対応する外壁平坦部38、39には、異物捕集溝が形成されることなく、この外壁平坦部38、39の下端はフ

ィルタ本体3の端部、すなわち第二小径部10の外周側壁まで延びている。

【0020】通孔28を形成するノズルホルダ2の内壁25と第一小径部29の外周側壁29aとの間には、第一異物捕集溝32、33から外壁平坦部38、39まで周方向にろ過隙間LL₂、L₂、M₂、S₂が形成されており、第1実施例と同様に、

$$LL_2 > L_2 > M_2 > S_2$$

の関係がある。これは、第一異物捕集溝32に流入した燃料が第一小径部29の周方向に流れ、入った異物の大きさによって異物が捕集される箇所が異なることを示している。すなわち、大きい異物から順に第一異物捕集溝32、33、第一小径部29の外周側壁29aとノズルホルダ2の内壁25との間の通孔28a、第二異物捕集溝34、35、36、37、第一小径部29の外周側壁29aとノズルホルダ2の内壁25との間の通孔28bに捕集される。これにより、第1実施例と同様、異物の大きさに応じて第一捕集溝32、33、通孔28a、第二捕集溝34、35、36、37、通孔28bで異物が捕集される。

【0021】第2実施例によると、第一小径部29を六角柱状にしたことにより、ノズルホルダ2の内壁25と第一小径部29の外周側壁29aとの間隔が広がることから、通孔28aの容積を増加させることができ、また最も広いろ過隙間LL₂と最も狭いろ過隙間S₂との比を大きくすることができる。しがって、大きい異物を第一異物捕集溝32、33またはろ過隙間LL₂で捕集し、ろ過隙間LL₂、L₂、M₂より小さい異物をろ過隙間Sで捕集できる。これにより、異物の大きさに応じて第一捕集溝32、33、通孔28a、第二捕集溝34、35、36、37、通孔28bで異物が捕集され、ろ過隙間LL₂、L₂、M₂より大きな異物はろ過隙間S₂の所には

流れこないため大きな異物による目詰まりの発生が防止できる。

【図面の簡単な説明】

【図1】本発明の第1実施例によるフィルタの縦断面図である。

【図2】図1に示すII方向矢視図である。

【図3】図1に示すIII-III線断面図である。

【図4】図1に示すIV-IV線断面図である。

【図5】本発明の第2実施例によるフィルタの縦断面図である。

【図6】図5に示すVI方向矢視図である。

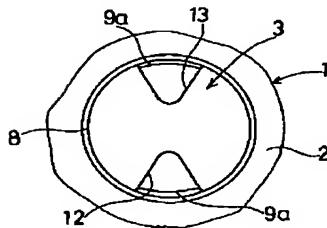
【図7】図5に示すVII-VII線断面図である。

【図8】図5に示すVIII-VIII線断面図である。

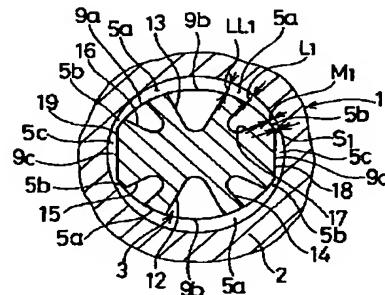
【符号の説明】

1	フィルタ
2	ノズルホルダ
3	フィルタ本体
5、6、28	通孔
8	大径部
9、29	第一小径部（小径部）
10	第二小径部（小径部）
12、13、32、33	第一異物捕集溝
14、15、16、17、34、35、36、37	第二異物捕集溝
18、19	平坦部
25	内壁
38、39	外壁平坦部
LL ₁ 、LL ₂	ろ過隙間
L ₁ 、L ₂	ろ過隙間
M ₁ 、M ₂	ろ過隙間
S ₁ 、S ₂	ろ過隙間

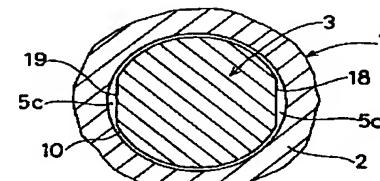
【図2】



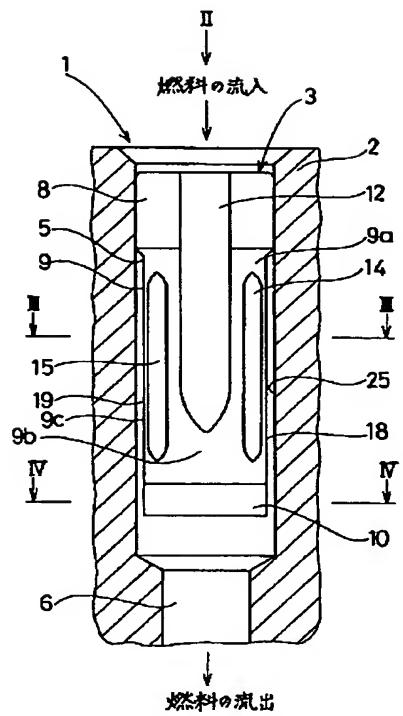
【図3】



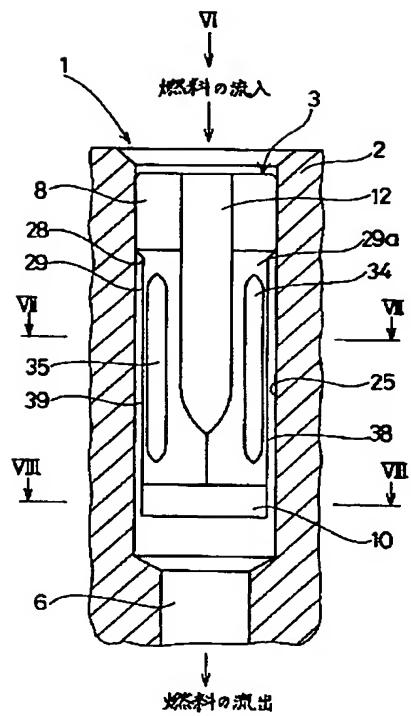
【図4】



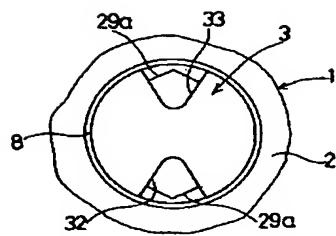
【図 1】



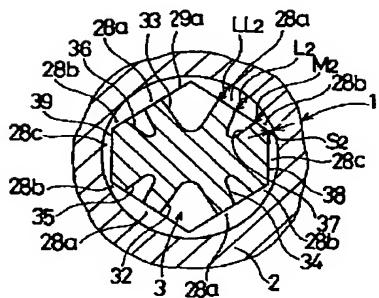
【図5】



【図6】



【図7】



【図8】

